Association of Transportation Safety Information Professionals

Application for Best Practices Recognition
2004

Part One: Project Summary

Project Title: IDOT GIS Crash Analysis System (GIS/CA)

Project Description:

Geographical Information System (GIS) technology is now being used by personnel at the Illinois Department of Transportation (IDOT) for crash analysis. IDOT is responsible for maintaining and keeping safe 17,000 miles of highway in the State of Illinois. IDOT has a central office in Springfield, Illinois, with nine District Offices throughout the state using GIS/CA.

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Participating/Cooperating Agencies (if any):

Which National Agenda goals apply?
1 – The GIS/CA project involved leaders who promote the importance of highway safety information systems, used for safety policy and program decision-making.

2 – The GIS/CA project involves the coordination of the collection, management and use of highway safety information among various organizations responsible for highway transportation policy.

3 – The GIS/CA project represents an example of integrating the planning of highway safety programs with highway safety information systems.

4 – The GIS/CA project represents an example where managers and users of highway safety information have utilized the necessary resources to select the appropriate technology to meet information needs.

5 – The GIS/CA project represents examples of highway safety professions being trained in the analytic methods appropriate for evaluation of highway safety information.

6 – The GIS/CA project involves the promotion and use of technical standards for characteristics of highway safety information systems, critical to the development and management of highway transportation safety programs and policies.

Which steps in the management process does the project support
The GIS/CA project supports the following management steps:

(1) Establish Safety Goals,
(2) Identify Problems,
(3) Plan Programs/Countermeasures,
(4) Implement Programs,
(5) Monitor Program Operations, and
(6) Evaluate Effectiveness

Reference the priority in your traffic records strategic plan to which this project applies:

GIS/CA is the #3 initiative in the Division of Traffic Safety's Balanced Scorecard Strategic Plan.

Project Cost: planned $:   0   actual $: 0 (In-House Project Team)

Extent of Project Implementation: Fully implemented.

GIS/CA System – Benefits Summary

The following are some of the benefits of the GIS/CA System.
- Improved public safety
- More strategic use of personnel
- More effective use of available funds (i.e. Hazard Elimination)
- Improved responsiveness to requests for analysis
- Visual representation of crash locations
- Ability to create maps as needed
- Access to data files associated with crashes for further analysis using other software packages.
- Has powerful Query capabilities
- Timeliness of data along with ability to print reports without accessing the mainframe
- Allows users to locate study areas more easily
- Capability of saving a project for more analysis

Part Two: Project Detail

Project Description: GIS Crash Analysis System users in each of the nine District offices and the central office now use GIS technology to analyze, map and report crash information. These users receive multiple requests for crash information from IDOT engineers, the news media, legislators, county governments, city governments, the Federal Highway Administration, and the general public on a daily basis. In the past, it could take days or weeks to produce a plot diagram requested by the district offices. Then the plots had to be mailed to the respective district office, creating a further time delay. Now with the GIS Crash Analysis System, a request will take from a few minutes to a couple of hours to complete, depending on the complexity of the request. Since the districts each have access to the GIS Crash Analysis System, they can do the report themselves or can request the information in various formats from Traffic Safety.

In addition to the availability of crash data, the highway inventory, bridge inventory, and the railroad crossing inventory data are also available in the GIS Crash Analysis System. Previously, high accident location maps were manually prepared, usually by taking a county map and putting on stick-on dots (intersections) or pieces of tape (segments) to show the high accident locations. This process often took two to three people over a month to complete. Duplication and distribution of the maps occurred after that. These maps are now being created electronically using the GIS system and are available as soon as the data is available for downloading.

Complex queries, such as crashes that have occurred on roads with bi-directional turn lanes, are now possible. With the new GIS Crash Analysis System, the users can produce reports that not only give the details of the crashes, but also summarize the data in chart formats. The users can also create a diagram of an intersection that specifies the location and the types of crashes at that location. The program also gives the user the ability to export the data files into other software packages, such as Excel or Access for further analysis or manipulation. This flexibility has greatly enhanced the Districts ability to perform their functions.

Great care was taken to make the GIS Crash Analysis System user-friendly. Initial training only took 2 and 1/2 days and included the basics of using the GIS software as well as the application system itself. The GIS Crash Analysis System is more intuitive for the users to work with than the old reporting system. With the previous reporting system, the users were required to request reports from the Central Office - Division of Traffic Safety and had to describe in detail the section of road they were interested in. With the GIS Crash Analysis System, the users simply navigate to the desired location and access the desired year(s) of crash data. Within the project, the user also has the ability to select the same type of report always used or one of the reports designed to handle other requests. The program allows the user to create a custom report, based on the current data needs. This type of flexibility was only possible before by requesting the data through a programmer and waiting a week or more for the information. Even though the report could be produced, there was no graphical representation that was associated with it.

Referring to the National Agenda Goals, tell how your project relates to each one you listed in Part One of this application:

1 – The GIS/CA System involved leaders who promote the importance of highway safety information systems, used for safety policy and program decision-making.

Tim Martin, the Secretary of the Illinois Department of Transportation has stated that his number 1 priority is "Improved Safety on Roads and Bridges. Secretary Martin and Traffic Safety Director Tom Dilello have stressed the importance of highway safety information systems, such as GIS/CA, and its impact on safety policy and program decision-making. Having the ability to make maps has greatly enhanced our managers' ability to immediately grasp the scope of any issues associated with the area. Previously, they were given reports which listed the milestations and had to determine where the points were by referring to a map.

2 – The GIS/CA project involved the coordination of the collection, management and use of highway safety information among various organizations responsible for highway transportation policy.

IDOT currently receives approximately 600,000 paper crash reports per year for processing. The major goal of GIS/CA is to leverage the use of technology to improve the quality, accuracy and timeliness of crash analysis and reporting.

3 – The GIS/CA System represents an example of integrating the planning of highway safety programs with highway safety information systems.

GIS/CA has a positive impact on roadway engineering, traffic signal warrant studies, speed studies, state property damage identification, project and funding determination, project improvement evaluations, public safety programs and safety project decisions. GIS/CA is integrated with the High Accident Location System, and the Illinois Highway Inventory System.

4 – The GIS/CA project represents an example where managers and professional users (safety analyst and engineers) of highway safety information have utilized the necessary resources to select the appropriate technology to meet information needs.

GIS/CA employs sophisticated GIS technology:

- GIS location tool to improve locating crashes and capturing coordinates to improve analysis and access to crash data.

- Intersection Magic Crash Diagramming tool to provide a visual representation of the crash, roadway and features. The resulting diagrams are used by engineers to evaluate causation and identify potential improvements to roadways and roadway features.

5 – The GIS/CA System project represents examples of highway safety professionals being trained in the analytic methods appropriate for evaluation of highway safety information.

One area of needed improvement identified was the ability to query the data to focus on certain areas of interest. By allowing the user to filter out certain data selections, concentrated analysis can be done on pertinent aspects of the information. Previously, the only way to obtain this type of information was through the

mainframe. Implementation and support plans included extensive training on the use and operation of the GIS/CA System.

6 – The GIS/CA project involves the promotion and use of technical standards for characteristics of highway safety information systems, critical to the development and management of highway transportation safety programs and policies.

> The GIS/CA project promotes the use of crash data integrated with roadway data to develop the most appropriate countermeasures in keeping with our directives to make the roads safer. Using the GIS/CA project, an analyst can evaluate problematic characteristics of crashes (such as wet weather crashes) that are proportionally overrepresented at locations on a roadway network. This type of analysis can help to identify a possible deficiency in the roadway environment. For the wet weather example, a detailed review may be needed at those locations where proportionately more crashes occurred on wet pavement. The roadway at those locations may need drainage improvements or a friction overlay added to the pavement

Referring to the management approach to highway safety, tell how your project supports the management steps you listed in Part One:

The GIS/CA System Project followed these management steps:

(1) Establish Safety Goals,
(2) Identify Problems,
(3) Plan Programs/Countermeasures,
(4) Implement Programs,
(5) Monitor Program Operations, and
(6) Evaluate Effectiveness

The first step in the GIS/CA project was the development of the planning and requirements specifications document. This product defined the overall goals and objectives and a complete list of emphasis areas that were addressed by the resulting GIS/CA system.

Also included in step two was the selection of an In-house project manager and project team members. A clear consensus was reached between management sponsors (including District Engineers) and the project team prior to proceeding to step three.

Step three was comprised of detailed analysis and design. Management sponsors reviewed the design and approved proceeding with the project.

In step four, estimates for the development and testing of program code management were prepared.

Step 5 consisted of the development of a GIS/CA prototype system. The project team and management sponsors monitored the testing/implementation of pilot GIS/CA in the Central Office and Districts 1 & 9. Regular reviews were conducted with users providing feedback to the project team.

In step six, GIS/CA was fully implemented with three full years of crash data. Ongoing support involves troubleshooting, training of new users as well as upgrading to keep up with new software releases.

Describe the major process steps for your project, including any unique aspects that enhanced success:

1) Getting input from the districts on their needs in the Crash Analysis Project, such as what types of reports would they want to have as templates.
2) Setting up procedures for downloading from the server.
3) Funding for workstations
4) Installation of workstations
5) Installation of software
6) Training of personnel
7) Continued support of users.

Provide the evidence and reasoning used to determine the success of the project:

Our District 1 office in Schaumburg has found that the GIS/CA very useful for its analysis purposes. After evaluating an area for possible countermeasures, they obtain copies of the crash reports and look for discrepancies in the data. They have been quite successful in locating areas which were not being accurately coded for a variety of reasons. Occasionally, there are two streets with the same name that intersect a route. With the use of the GIS/CA, it is much easier to identify these multiple intersections, get the case numbers and study the police reports to obtain additional information.

Our District Five office in Paris has been successful in using the GIS/CA in determining issues with an unusual intersection in Champaign/Urbana. The intersection of U45 at Wright St. is offset by 50 feet. They were evaluating the intersection to make some improvements and wanted us to determine if some of the intersections that were close to the intersection could be considered "intersection related" crashes. There is a Big foot gas station that is on the west side of this area. After reading the crash reports for this area, it was determined that some of the crashes had been misplaced but the majority of the ones in question were related to the placement of the "Big Foot" Gas Station. There have been improvements made to this intersection as a result of this thorough analysis of the offset intersection.

Why should this project be recognized as a best practice in traffic records?
The GIS Crash Analysis System is being used daily throughout the Department saving numerous personnel hours. The IDOT District One office (Chicago area) previously had personnel assigned to create the intersection diagrams using their Computer Aided Drafting & Design System, with a turn-around time in "days". With the new software, the intersection diagrams can be created in a matter of "minutes".

Besides saving time, the Department can respond to requests for information in a more professional and timely manner. Because of a data backlog with the old reporting system, the District users would resort to requesting copies of police reports and manually tabulating the data. Now, IDOT personnel can spend more time analyzing the crash data instead of collecting it, and make better decisions about how money allocated for traffic safety projects should be spent.